CHEMICALS

Project Fact Sheet

CONCURRENT DISTILLATION

BENEFITS

- Capacity increases of up to 100% greater than sieve trays
- Minimized downcomer and entrainment flooding
- Increased mass transfer between the gas and liquid phases
- One-third lower cost compared to standard columns
- Energy savings of 10%

APPLICATIONS

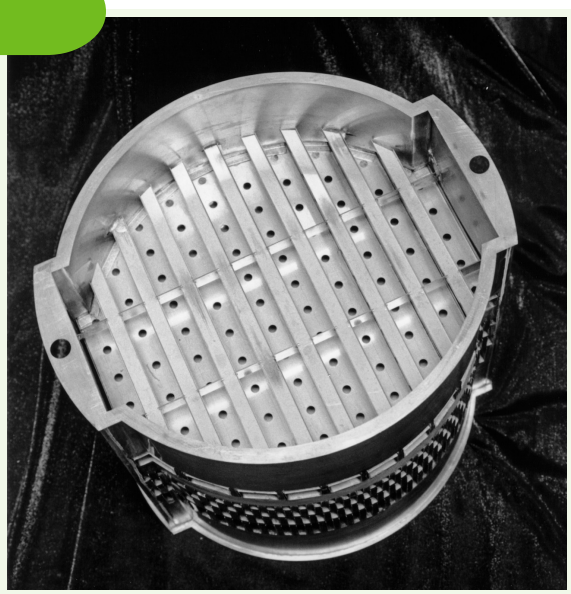
Concurrent distillation is an efficient distillation process that can be used to perform separations wherever high-pressure distillation trays are used, such as in the petroleum, chemical, food, pulp and paper, and pharmaceutical industries.

INNOVATIVE CONCURRENT DISTILLATION PROCESS PROMISES TO IMPROVE PERFORMANCE AND ENERGY EFFICIENCY OF SEPARATIONS

Distillation is a process used extensively to perform separations in a variety of industries, including the chemical, petroleum, food, pulp and paper, and pharmaceutical industries. Despite recent advances, distillation remains an energy intensive process, utilizing an estimated 4.8 quadrillion BTUs of energy annually. Concurrent distillation offers an alternative process that has been shown in bench-scale testing to have higher energy efficiency and better performance than conventional distillation.

In concurrent distillation, entering vapor and liquid combine as they move up the distillation column. Then, the vapor and liquid are separated so that the liquid flows downward to the trays below. This unique and patented design, called CoFlo™, allows for greater vapor and liquid handling. Total capacity increases of up to 100% over sieve trays are possible, without sacrificing efficiency. Gas and liquid are distributed more evenly, making it ideal for de-bottlenecking. Concurrent distillation has the potential to reduce distillation column costs by one-third. It is estimated that the adoption of this technology will ultimately reduce the U.S. direct consumption of energy for distillation by 10%.

CoFlo™ Tray



The CoFlo ™ Tray is a gas-liquid contacting device for use in distillation, absorption and stripping columns.

Project Description

Goal: To improve the performance of high-pressure distillation trays by using a concurrent flow design, to determine the economics of this innovative process, and to manufacture and pilot test the design in an industrial application.

The device operates on the principle that entering vapor and liquid are combined such that all of the liquid is entrained upward with the vapor. The dispersion process takes place in this contacting stage, and integral with this stage is a vapor-liquid separator. Collected liquid is returned to the tray below via an alternating side downcomer. The net result of this configuration is that vapor flows from bottom to top, as in a traditional counter-current contacting device, but the liquid travels down in loops being entrained up one tray and then falling to the tray below in the downcomer. The unique and patented design of the CoFlo™ Tray allows for significant increase in vapor and liquid handling without sacrificing separation efficiency. This is achieved by utilizing co-current flow within the tray. Liquid from the downcomer is fed uniformly to the tray by means of perforated trough dispersers. Vapor to the tray flows upward though slot-like openings between the troughs.

The open (slot) area is typically in the range of 15 to 25% of the tray active area. The high vapor velocity emerging from the slot atomizes the liquid and carries it upwards to the entrainment collectors where the liquid is separated and sent to the downcomer feeding the tray below. The liquid flowing to the downcomer is free of entrained vapor and thus the downcomer backup comprises clear liquid.

Progress & Milestones

Work has already been completed on the research and development of a bench-scale model of the CoFlo™ Tray, and a patent has been issued for the design. Efforts are now being made to

- design a pilot-scale model,
- test the pilot-scale model in an industrial application,
- determine the economics of the process, and
- develop the manufacturing specifications for a commercial-scale model.

Commercialization

Once the CoFlo™ Tray has been pilot tested in an industrial setting and the manufacturing design has been completed, Jaeger Products will develop a marketing plan to commercialize the technology.

Project Partners

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